

Coleman Creek Consulting, Inc.

INITIAL RADON AIR SAMPLING OF HENLEY MIDDLE HIGH SCHOOL FOR KLAMATH COUNTY SCHOOL DISTRICT 2845 GREENSPRINGS DRIVE, KLAMATH FALLS, OREGON

INTRODUCTION

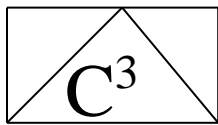
Coleman Creek Consulting, Inc. (CCC) was retained by Klamath County School District (KCS D) to perform radon air sampling as required by State Statute ORS 332.166-167. KCS D is required to perform complete radon air testing of District owned and occupied facility buildings by January 1, 2021. The purpose of the initial radon air sampling was to collect radon air samples from all regularly occupied rooms within school buildings, with the exception of storage, restrooms, kitchen, locker rooms, and compare analytical results with the EPA recommended “Action Level” concentration for radon. Short-term radon air sampling was selected for this project.

RADON INFORMATION AND HEALTH EFFECTS

Radon is a naturally occurring radioactive gas that is produced by natural deposits of uranium in soil, and is found world-wide. Uranium naturally decays into Radium, and Radium can produce Radon gas. Radon gas can travel up through soil and enter buildings in contact with soil. Radon gas entering a building may become concentrated in the lowest part of the building in areas with little fresh air mixing. If radon is inhaled into lungs, particle decay processes can release radiation, potentially damaging lung tissue, and over time leading to lung cancer. The Environmental Protection Agency (EPA) has estimated that Radon is the primary cause of lung cancer among non-smokers. EPA recommends reducing the concentration of Radon in indoor environments to below the Action Level of 4.0 pCi/L (pico-curies per Liter of air).

INITIAL RADON AIR SAMPLING

David W. Fawcett of CCC trained KCS D employees, including school custodians in radon sampling procedures December 4, 2020. Mark Teel, Henley Middle School (HMS) Custodian placed radon air test kits in the Brixner buildings at the beginning of the day, December 7, 2020. A total of 41 locations were sampled according to guidelines established in the Oregon Health Authority (OHA) “Testing for Elevated Radon in Oregon Schools, A Protocol and Plan”, dated 2016. Mr. Teel returned to HMS December 10, 2020, at the beginning of the day, and collected all radon test kits placed for sampling. See Radon Air Sample Record Sheets (pages 4-5) for locations of all areas sampled. All samples collected were packaged by Mr. Fawcett, and sent overnight to Air Chek, Inc., in Mills River, North Carolina for analysis.



LABORATORY ANALYSIS RESULTS

The radon air test kit samples collected from HMS buildings were reported ranging from <0.3 to 0.8 pCi/L (picocuries per liter of air). All test kits sampled were given the designation “Z” by the laboratory on the analytical report, indicating the test kits were not completely sealed. Mr. Fawcett contacted Air Chek to discuss, and laboratory personnel indicated that radon could be both absorbed and released with an incomplete seal. A complete listing of laboratory results and locations is found in the Air Chek, Inc. Laboratory Analysis Report in Appendix A.

QUALITY ASSURANCE

To ensure that test results are reliable and accurate, quality assurance samples, including duplicate test kits (placed in same room), blank test kits (not sampled at all), and spike sampling (exposing test kits to a measured amount of radon prior to laboratory submission) were all employed during Radon sampling. The number of duplicate, blank, and spike test kits utilized during sampling followed OHA testing protocol guidelines.

DUPLICATE TEST KITS

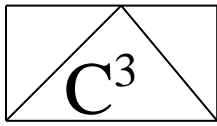
A total of four duplicate test kits were placed during initial test kit sampling. See duplicate designation on the Radon Air Sample Record Sheets. The four duplicate test kit sets were reported with the following paired results <0.3/<0.3 pCi/L, <0.3/<0.3 pCi/L, 0.6/0.6 pCi/L, and <0.3/<0.3 pCi/L,. When compared with matched pair or “duplicate” test kits, all four were well within the expected range of 0-25% Relative Percent Difference, with identical reported <0.3 pCi/L and 0.6 pci/L Radon concentrations.

BLANK TEST KITS

Two blank test kits were submitted to Air Chek with the other HMS Radon test kits. Both blank test kits were reported with <0.3 pCi/L. All blank tests were reported none detected for Radon.

SPIKE TEST KIT ANALYSIS

One test kit was submitted to Bowser-Morner for Radon Spike processing. The test kit was exposed to 25.7 pCi/L for three days from December 4 through December 7, 2020. See Appendix B for the Bowser-Morner Radon Exposure test information. The “Spiked” test kit was submitted to Air Chek for analysis along with the other TES Radon test kits. The Spike sample was reported with 15.9 pCi/L. The relative percentage error was calculated to be -38%, in the out of control range (greater than -30%). The Spike lab Bowser-Moerner was contacted, and did not report any unusual occurrence during Spike activities. The analytical lab (Air Chek) was contacted, and no unusual occurrences were noted during test kit analysis. Spike test kits were shipped twice during cold temperatures, and that may have had an effect on the Spike sample results. In addition, the complete KCSD Spike sample results exhibit a rather uniform grouping, with results ranging from 13.0 to 17.0 pCi/L, all below the Spiked concentration of 25.7 pCi/L. The Spike sample is identified as Serial #9418370 on the Laboratory Analysis Report in Appendix A.



RADON RESULTS AND FUTURE ACTIONS

The 2016 OHA Testing of Elevated Radon in Oregon Schools Protocol and Plan describes future steps to take based on initial Radon sample results. The following is a description of recommended actions based on Radon concentrations reported.

1. If <2.0 pCi/L Radon is reported, ORS 332.166-167 requires Radon re-test every 10 years.
2. If 2.0 pCi/L to 4.0 pCi/L Radon is reported, consider lowering the Radon concentration in the room.
3. If 4.0 pCi/L to 8.0 pCi/L Radon is reported, perform follow-up Radon measurement in the affected room(s) using a long-term test. Conduct over the school year as much as possible. If that result is equal to or greater than 4.0 pCi/L, Radon concentration in the room should be lowered.
4. If equal to or greater than 8.0 pCi/L Radon is reported, conduct a second short-term test and average the result with the initial Radon result. If the average result of the two short-term tests is equal to or greater than equal to or greater than 4.0 pCi/L, Radon concentration in the room should be lowered.

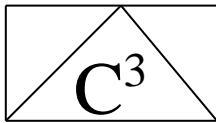
DISCUSSION OF INTIAL RADON SAMPLING RESULTS

The initial Radon short-term sampling in Henley Middle School buildings were reported with Radon concentrations ranging from <0.3 to 0.8 pCi/L. All Radon test kit samples were reported < 2.0 pCi/L, indicating that a re-test should be performed in 10 years.

CCC appreciates the opportunity to provide initial radon air testing and consulting to Klamath County School District.

Sincerely,

David W. Fawcett
Director of Consulting Operations



Coleman Creek Consulting, Inc.

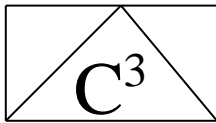
RADON AIR SAMPLE RECORD SHEET

SCHOOL: Henley Middle School
ADDRESS: 7925 Hwy. 39
Klamath Falls, Oregon

DATE: 12-07-20/12-10-20
SAMPLER: Mark Teel

SERIAL #	BUILDING	Duplicate	LOCATION	START TIME	STOP TIME
9418336	Main		1 – Kappas	0633	0645
9418337	Main		2 – Ramirez	0634	0645
9418338	Main		3 – Mann	0635	0646
9418339	Main		4 – Kreed	0636	0646
9418340	Main		5 – Olman	0637	0650
9418341	Main		6 – Health	0638	0650
9418342	Main		7 – Library	0650	0652
9418343	Main		8 – Skelton	0655	0655
9418344	Main		9 – Mahanna	0700	0700
9418345	Main		10 – Ovgard	0701	0705
9418346	Main	Yes	10 – Ovgard	0701	0707
9418347	Main		11 – Beard	0705	0710
9418348	Main		12 – Day Care	0710	0712
9418349	Main		13 – Hill	0715	0716
9418350	Main		14 – Room 4	0720	0720
9418351	Main		15 – Room 6	0725	0723
9418352	Main		16 – Room 8	0730	0727
9418353	Main		17 – Room 10	0735	0729
9418354	Main		18 – Room 12	0735	0735
9418355	Main		19 – Gym	0740	0739
9418356	Main		20 – Gym	0745	0742
9418357	Main	Yes	20 – Gym	0745	0746
9418359	Main		21 – Gym	0750	0750

Comments: **Spike Sample =**
Blank Sample = 9418358



Coleman Creek Consulting, Inc.

RADON AIR SAMPLE RECORD SHEET

SCHOOL: Henley Middle School
ADDRESS: 7925 Hwy. 39
Klamath Falls, Oregon

DATE: 12-07-20/12-10-20
SAMPLER: Mark Teel

SERIAL #	BUILDING	Duplicate	LOCATION	START TIME	STOP TIME
9418360	Main		22	0755	0751
9418361	Main		23	0800	0800
9418362	Main		24	0801	0804
9418363	Main		25	0805	0807
9418364	Main		26	0806	0812
9418365	Main		27	0810	0817
9418366	Main		28	0815	0820
9418367	Main		29	0820	0822
9418368	Main		30	0821	0822
9418369	Main	Yes	30	0821	0822
9418371	Main		31	0825	0823
9418372	Main		32	0830	0823
9418373	Main		33	0835	0824
9418374	Main		34	0840	0824
9418375	Shop		35	0850	0825
9418376	Shop		36	0850	0825
9418377	New		37	0855	0826
9418378	New		38	0900	0826
9418379	New		39	0905	0827
9418380	New		40	0910	0827
9418381	New	Yes	40	0910	0828
9418383	New		41	0915	0828

Comments: **Spike Sample = 9418370**
Blank Sample = 9418382

APPENDIX A

AIR CHEK LABORATORY ANALYSIS REPORT

Radon test result report for:**HENLEY MS****20571400**

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418336	KAPPAS	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418337	RAMIREZ	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3 Z	2020-12-15
9418338	MANN	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3 Z	2020-12-15
9418339	DREED	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3 Z	2020-12-15
9418340	OLMAN	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3 Z	2020-12-15
9418341	HEALTH	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3 Z	2020-12-15
9418342	SKELTON	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3 Z	2020-12-15
9418343	MAHANNA	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3 Z	2020-12-15
9418344	OVGARD	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3 Z	2020-12-15
9418345	OVGARD	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3 Z	2020-12-15
9418346	BOARD	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3 Z	2020-12-15
9418347	BABY SIT	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	0.8 ± 0.4 Z	2020-12-15
9418348	HILL	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3 Z	2020-12-15
9418349	4	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3 Z	2020-12-15
9418350	6	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3 Z	2020-12-15
9418351	8	2020-12-07 @ 7:00 am	2020-12-10 @ 7:00 am	< 0.3 Z	2020-12-15
9418352	10	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3 Z	2020-12-15
9418353	12	2020-12-07 @ 8:00 am	2020-12-10 @ 7:00 am	< 0.3	2020-12-15
9418354	GYM	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418355	GYM	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418356	GYM	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418357	GYM	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418358	GYM	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418359	GYM	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418360	GYM	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.7 ± 0.4 Z	2020-12-15
9418361	14A	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418362	14B	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418363	HEALTH 2	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418364	NURSE	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418365	16	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418366	STORE	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418367	CAFETERIA	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418368	CAFETERIA	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.6 ± 0.4 Z	2020-12-15
9418369	CAFETERIA	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.6 ± 0.4 Z	2020-12-15
9418370	CAFETERIA	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	15.9 ± 1.0	2020-12-15
9418371	23	2020-12-07 @ 8:00 am	2020-12-10 @ 8:00 am	0.6 ± 0.4 Z	2020-12-15
9418372	21	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15

December 24, 2020

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:

HENLEY MS

20571400

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418373	17	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418374	STAFF	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15

Air Chek 1936 Butler Bridge Rd, Mills River, NC 28759-3892 Phone: (828) 684-0893 Fax: (828) 684-8498

December 24, 2020

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:
HENLEY MS
20571406

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418375	HIVE A	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418376	HIVE B	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15

Air Chek 1936 Butler Bridge Rd, Mills River, NC 28759-3892 Phone: (828) 684-0893 Fax: (828) 684-8498

December 24, 2020

**** LABORATORY ANALYSIS REPORT ****

Radon test result report for:

HENLEY MS

20571407

Kit #	Room Id	Started	Ended	pCi/L	Analyzed
9418377	CAMPBELL	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418378	PERKINS	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418379	CREBIN	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418380	MCQUIST.	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15
9418381	MCQUIST.	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	0.6 ± 0.5 Z	2020-12-15
9418382	MCQUIST.	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3	2020-12-15
9418383	STAFF	2020-12-07 @ 9:00 am	2020-12-10 @ 8:00 am	< 0.3 Z	2020-12-15

Air Chek 1936 Butler Bridge Rd, Mills River, NC 28759-3892 Phone: (828) 684-0893 Fax: (828) 684-8498

APPENDIX B

BOWSER-MORNER RADON SPIKE EXPOSURE

EXPOSURE IN BOWSER-MORNER RADON CHAMBER

CLIENT Coleman Creek Consulting, Inc. Job Number 198582

NOMINAL Conditions: Radon Conc 25.7 pCi/L Rel. Hum 59.0 % Temp. 70.3 F

Date Start: 12/4/20 Date Stop: 12/7/20 Date Start: _____ Date Stop: _____

Time Start: 0923 Time Stop: 0923 Time Start: _____ Time Stop: _____

(Group 1)

Device No.'s: (12) Char Bags -

9417935, 9417970, 9418007,

9418060, 9418096, 9418127,

9418163, 9418190, 9418226,

9418250, 9418286, 9418321

Device No.'s: _____

R5 Left

Date Start: ^{rem} 12/4/20 Date Stop: 12/7/20 Date Start: _____ Date Stop: _____

Time Start: 0927 Time Stop: 0927 Time Start: _____ Time Stop: _____

(Group 2)

Device No.'s: (13) Char Bags -

9418370, 9418418, 9418465, 9418500,

9418566, 9418601, 9418660,

9418695, 9418771, 9418747,

9418806, 9418846, 9418875

Device No.'s: _____

R5 Right

Date Start: _____ Date Stop: _____ Date Start: _____ Date Stop: _____

Time Start: _____ Time Stop: _____ Time Start: _____ Time Stop: _____

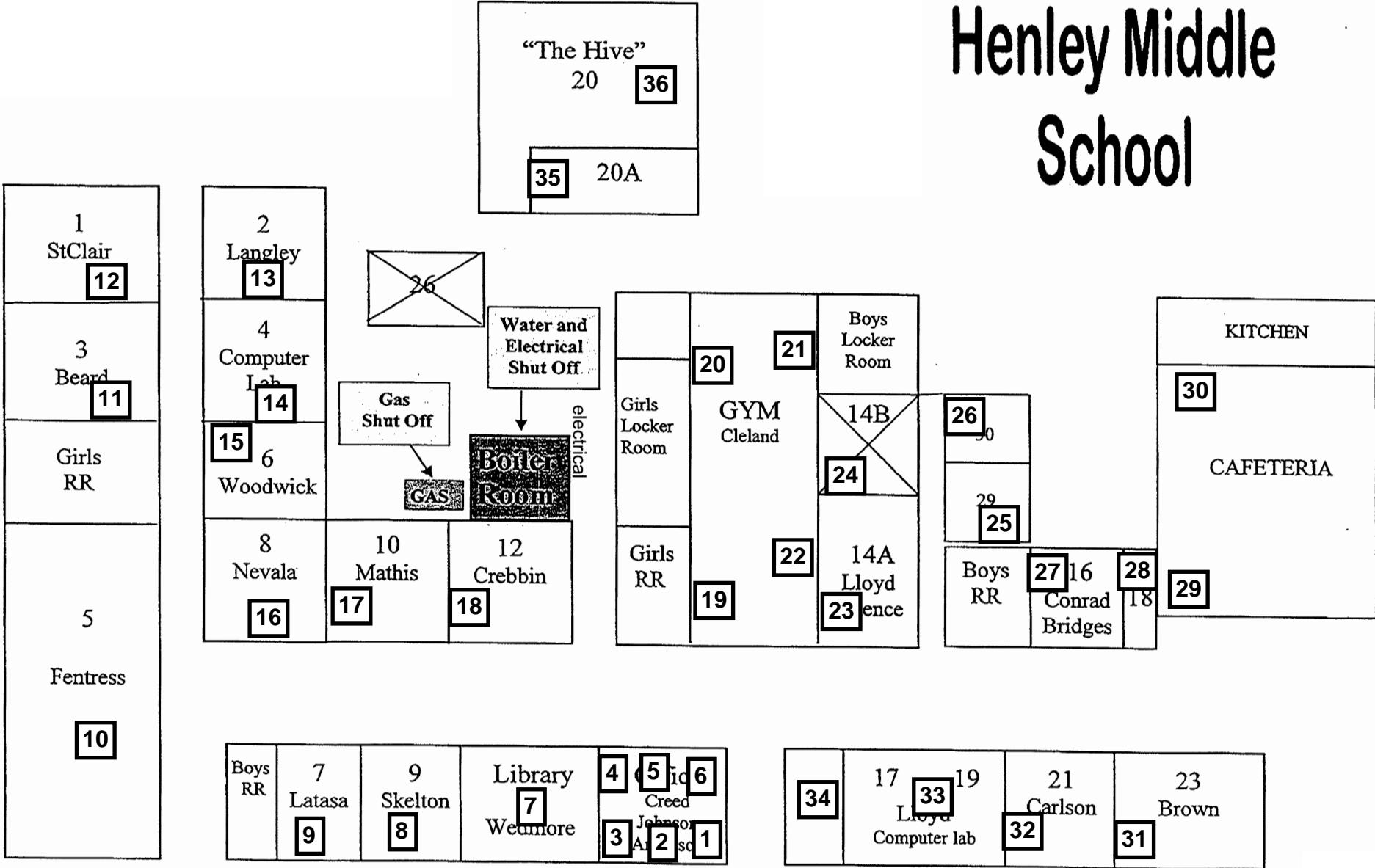
Device No.'s: _____ Device No.'s: _____

Note: All times are in 24-hour (military) notation, Eastern Standard Time (EST)
Background = 7 μ R/h Elevation = 820 ft

APPENDIX C

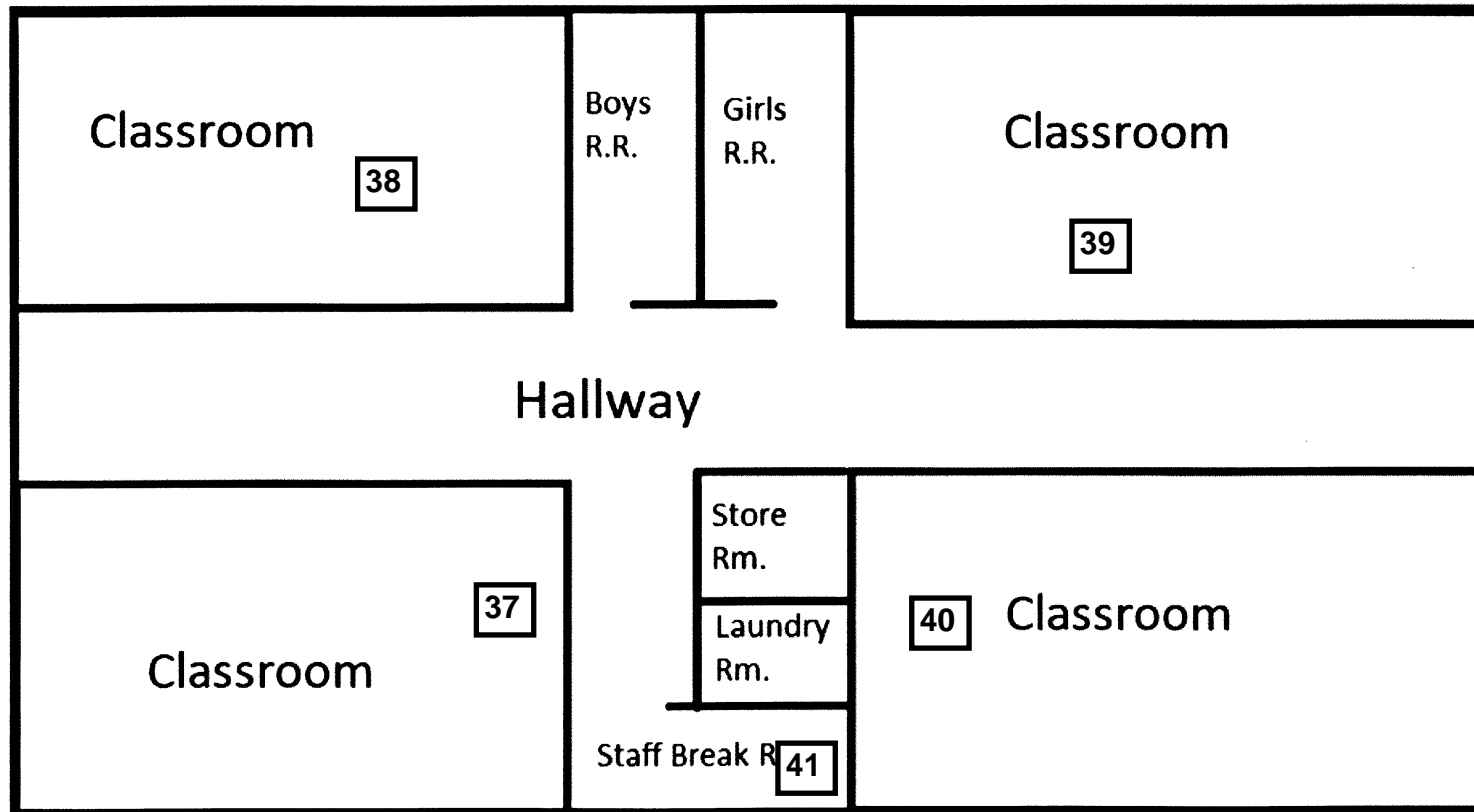
RADON SAMPLING LOCATION DIAGRAM

Henley Middle School



12 = Radon Test Kit Location

Henley Middle New classroom building



37 = Radon Test Kit Location